New North American Heterotropinae

(Diptera: Bombyliidae)

JACK C. HALL

Division of Biological Control, University of California, Riverside, 92502

The subfamily Heterotropinae is for the most part made up of an anomalous group of microbombyliids, rarely exceeding 5 mm in length. The anomaly is attested to by the fact that *Prorates* Melander was described as an empidid, *Caenotus* Cole as a therevid and *Apystomyia* Melander runs to the Scenopinidae in most keys to families.

Melander (1950) gave an account of the Heterotropinae together with a rearrangement of Curran's (1935) key to genera. Since 1950 none of the species belonging to the various genera comprising the Heterotropinae have been reported upon. The following account not only describes a new genus and several new species but greatly extends the range of distribution of the genus *Prorates*, hitherto known only from New Mexico and southern California.

The Heterotropinae may be separated from other Bombyliidae by the following combination of characters: Occiput flattened, not or only slightly foveate behind ocellar tubercle; eyes bisected into two sizes of facets, small below, large above, but without dividing line; inner margin of eyes usually indented opposite antennal bases; eyes of male usually holoptic, female dichoptic, wing with two submarginal cells; four posterior cells with first always open; anal cell closed before the margin and petiolate or closed at wing margin; anal lobe greatly developed; legs without conspicuous bristles; body not densely hairy.

KEY TO HETEROTROPINE GENERA

1. Second posterior cell petiolate at base 2
   Second posterior cell sessile, medial crossvein between fourth and fifth veins arises from discal cell 3
2. Third vein forks closer to r-m crossvein than to tip of wing *Prorates* Melander
   Fork of third vein closer to tip of wing than to r-m crossvein ..... *Apystomyia* Melander
3. Arista terminal, normal, of one or two segments 4
   Third antennal segment terminates in microscopic tuft of hair ..... *Caenotoides* Hall. n. gen.
4. Proboscis projects well beyond oral margin ..... *Heterotropus* Loew
   Proboscis at most only slightly projecting beyond oral margin .. *Caenotus* Cole

APYSTOMYIA Melander

(Fig. 1)

Apystomyia Melander, 1950: 146.

Melander based this genus on a number of specimens collected along streams in the mountains of southern California. *Apystomyia* was placed by Melander (1950) in the Heterotropinae "because it does not conform with any other subfamily . . . ." An examination of part of the type series confirms its placement but if and when additional species are discovered the genus should be reevaluated.

Known only from the genotype species—*A. elinguis* Melander.

The genus may be recognized not only by the characters given in the key to genera but also by the delicate neuration in the wing, the small second basal cell and consequently large discal cell. The head and thorax are polished black and the abdomen subopaque; the hair on the head and thorax is black and quite coarse, that on the abdomen is white. The knob is entirely black and the proboscis is short and non-projecting.

HETEROTROPUS Loew

(Fig. 2)

Heterotropus Loew, 1873: 182.

This genus contains a large number of Palearctic species. It is represented in the Nearctic region by a single species, *H. senex* Melander. Melander's specimen was collected in Arizona at flowers of *Baileya multiradiata.*

Heterotropus senex has the second posterior cell sessile and the anal cell closed at the wing margin; proboscis long; body black with yellow markings and white hair. The halters are whitish.

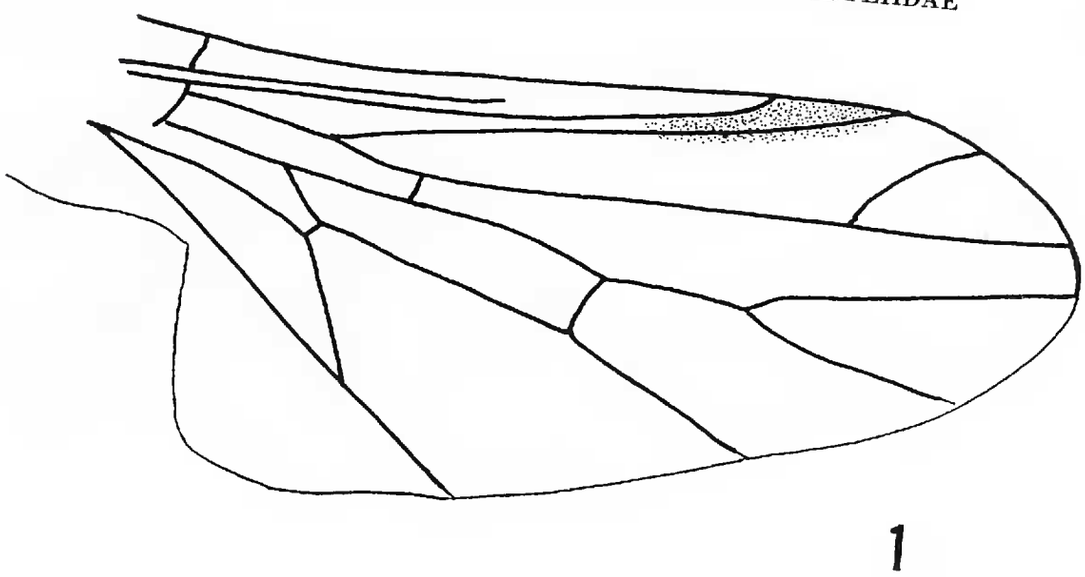
Type locality, Headquarters Organ Pipe National Monument, Arizona. The fly was collected on 16 April.

PRORATES Melander

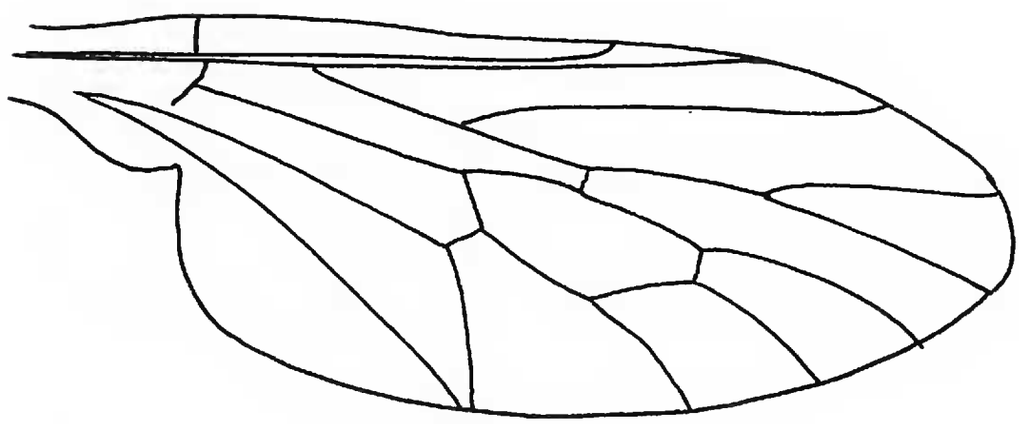
(Fig. 3)

Prorates Melander, 1906: 372 (as an empidid), 1927: 377; 1950: 145.
Alloxytropus Bezzi, 1926: 186.

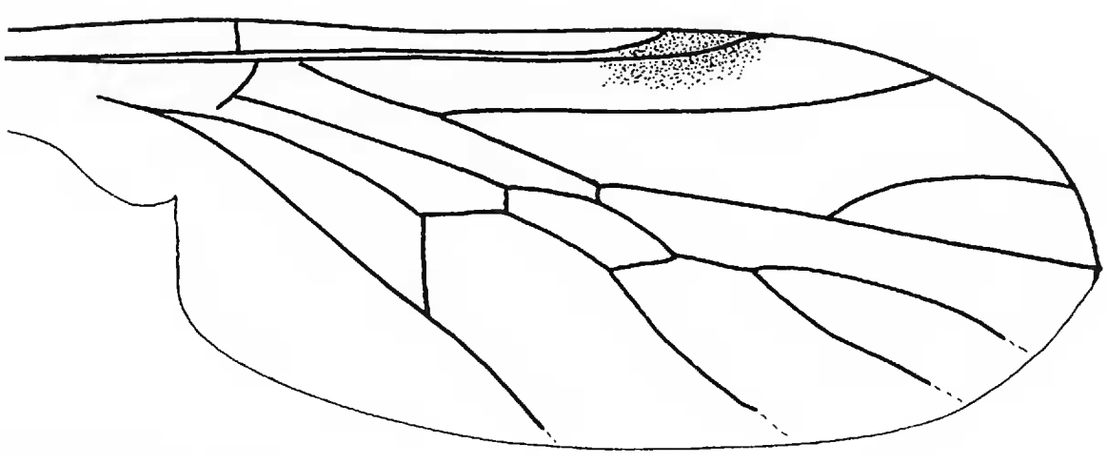
Originally described as an empidid but later transferred to the Bombyliidae because of the short costal vein. For many years the genus was known from a single species, *P. claripennis* Melander. Efflatoun (1945) under the name *Alloxytropus* Bezzi, recorded two species from Egypt. Melander (1950) synonymized this latter genus



1



2



3

FIGS. 1–3, wing of holotypes. FIG. 1. *Apsytomyia elinguis*. FIG. 2. *Heterotropus senex*. FIG. 3. *Prorates frommeri*.

with *Prorates*. Five additional species are described below bringing the total known species to eight.

Prorates may be diagnosed as follows: Proboscis projecting usually as far as or farther than the tip of the antennae, except in *P. boydi* Hall described below. Antennae with three segments, (not two as originally stated) first two very small, third elongate conical and covered with minute pubescence. Scutellum with two apical marginal bristles. Costal vein extends to or only slightly beyond the third longitudinal vein; wing usually with darkened stigma below apex of first vein; branch of fourth vein closer to r-m crossvein than to tip of wing; second posterior cell petiolate at base; discal cell smaller than second basal cell. Vestiture of short, fine, scattered hair, longer on underside of head and at base of abdomen.

Genotype species—*P. claripennis* Melander.

Key to Species of Prorates

1. Proboscis projecting well beyond oral margin 2
   Proboscis short, at most labellae extend beyond oral margin; body and legs black with white hair; knob of halter pale ..... *boydi* Hall, n. sp.
2. Hair on mesonotum white or yellow, may reflect brownish in some lights 3
   Hair or mesonotum and scutellum black; scutellar bristles of male black, of female testaceous; abdominal hair white ..... *nigrescens* Hall, n. sp.
3. Proboscis projecting beyond oral margin for a distance equal to or less than height of eye 4
   Proboscis projects twice eye height beyond oral margin; palpi long, extending as far as first antennal segment; legs fuscous; hair on abdomen yellow ..... *arctos* Hall, n. sp.
4. Legs fuscous, testaceous or dark brown, never mostly pale 5
   Legs and thoracic pleural area pale, sternopleura and femora may be dusky; basal antennal segments pale yellow; abdominal hair yellow ..... *frommeri* Hall, n. sp.
5. Abdominal hair golden yellow; proboscis usually extending beyond tip of antennae; legs or at least the tibiae usually yellowish brown; wing veins light brown ..... *melanderi* Hall, n. sp.
   Hair on abdomen pale yellow to white; proboscis extends as far as tip of antennae or only slightly beyond; legs brownish yellow, tibiae of female lighter; wing veins dark brown ..... *claripennis* Melander

Prorates boydi Hall, new species

Immediately separable from the congeners by the short, non-protruding proboscis and the entirely black body with pale hair.

Male.—Black, knees and tibiae brownish. Eyes contiguous down front for distance greater than length of ocellar tubercle. Ocellar tubercle and small triangular front bare. Antennae black, third segment may appear lighter in some lights; basal segments short, without apparent vestiture; third segment, in lateral view conical, broadest at base then tapering to narrow apex, at least twice as long as wide, microscopically pubescent; arista terminal, as broad as apex of third

segment. Face retreating, bare above, scattered short white hair below. Proboscis short, not projecting beyond oral margin. Palpi nearly as long as proboscis, one segmented. Occiput white pilose, hair not dense, nearly bare above.

Mesonotum dull, when viewed from in front brownish pollinose becoming whitish laterally; hair short, scattered, yellowish, longer and tending towards white near scutellum; bristles wanting (may be broken off). Pleura white pollinose, bare except for few thin whitish hairs on mesopleuron. Legs with short pale yellow hair, that on tibiae setaceous; bristles other than apical tibial bristles wanting; hind tarsus longer than hind tibia. Pulvilli as long as claws. Halter stem brownish, knob white. Squama white with fringe of white hair. Scutellum dull with long, erect, white hair, bristles wanting.

Wing hyaline, stigmal area faintly yellowish; anterior veins brown, rest pale. Costa terminates at fourth vein; second posterior cell short petiolate, and petiole shorter than r-m crossvein; r-m crossvein at middle of discal cell; discal and second basal cells of nearly equal length; petiole on anal cell longer than posterior crossvein; anal lobe large; alula moderately well developed.

Abdomen with short, erect, scattered white hair; posterior margin of second segment narrowly pale. Venter with posterior margins of second and third segments narrowly pale; short white hair overall. Genital capsule brownish, round, lateral plates moderately truncate at apex.

FEMALE.—Unknown.

Holotype and two paratypes from P. L. BOYD DESERT RESEARCH CENTER, (DEEP CANYON), 3 MI. S. PALM DESERT, RIVERSIDE COUNTY, CALIFORNIA, 20 June 1969 (S. Frommer and B. Worley), malaise trap at marker 57. One paratype male from Fish Springs, Imperial County, California, 13 September 1965 (R. C. Dickson), from a yellow sticky-board trap. Type deposited in U. S. National Museum.

PRORATES CLARIPENNIS Melander

Melander, 1906: 373.

Differs from the congeners by the black legs and black halters. The basal antennal segments are also black. *Prorates claripennis* is very similar to *P. melanderi* Hall. From this latter species *claripennis* may be separated by the shorter proboscis, which does not extend beyond the tip of the antennae and by the pale yellow to white, not golden, abdominal hair.

Melander's original description is short and as such incomplete. A full redescription of both sexes follows:

MALE.—Black, knees and fore coxae a little lighter. Halter stem and knob black. Eyes in contact down front for distance equal to length of ocellar tubercle; inner margin of eyes at most only slightly indented opposite antennal bases. Small triangular front bare. Basal antennal segments short, equal in length, each segment with two or three short yellowish hairs; third segment in lateral view elongate conical, flattened, one and one-half times longer than two basal

segments combined, microscopically pubescent; arista terminal, minute, not distinctly separated from third segment. Face receding, bare above, pale yellow to white hair below. Proboscis projecting, short, not reaching beyond apex of antennae; hair on labellae pale. Palpi testaceous, approximately one-third length of proboscis, hair short, pale. Occiput vaguely cinereous pollinose with short, scattered white hair.

Mesonotum vaguely cinereous pollinose with two median darker vittae; hair short, yellow; bristles yellowish. Pleura cinereous pollinose, essentially bare. Hair on legs pale yellow; hind tibia and tarsus of equal length. Pulvilli as long as claws. Squama pale, whitish with fringe of long pale hair. Scutellum cinereous pollinose, hair short, fine, scattered, pale; two apical bristles dark brown.

Wing hyaline, stigma dark brown, veins dark, only vaguely reaching posterior margin. Costa terminates at fourth vein; petiole at base of second posterior cell shorter than r-m crossvein; discal and second basal cells of nearly equal length; petiole on anal cell one and one-half times longer than posterior crossvein; alula moderately well developed.

Hair on abdomen pale yellow to white; posterior margin of third segment narrowly white in ground color. Venter with white hair. Genital capsule with yellowish hair, elongate and narrowly rounded apically.

FEMALE.—Very much like male except legs lighter colored. Knob of halter brownish yellow. Eyes at narrowest point separated by nearly one and one-half times width of ocellar tubercle. Eyes definitely emarginate opposite bases of antennae. Posterior margins of third and fourth segments narrowly pale; lateral margin from base to sixth segment pale; basal sternites with posterior margins narrowly pale. Otherwise as described for male.

Other than the holotype and allotype, both from New Mexico, I have seen no other specimens. Both are in the U. S. National Museum.

Prorates arctos Hall, new species

The long proboscis, dark color, well pronounced wing venation and the northern distribution will serve to distinguish this species.

FEMALE.—Black, tips of tibiae, knees and knob of halter pale; legs fuscous; head and thorax somewhat grayish pollinose. Eyes at narrowest point separated by more than width of ocellar tubercle. Front bare, slightly concave in front of ocellar tubercle. Eyes emarginate opposite bases of antennae. Basal antennal segments equal in length, each with a few short pale hairs; third segment slightly longer than two basal segments combined, elongate oval, microscopically pubescent; arista small, terminal. Face bare above, scattered pale hair below. Proboscis projecting nearly twice eye height beyond oral margin. Palpi testaceous, tips darker, with pale hair. Hair on occiput pale, short, scattered.

Mesonotum with two dark median vittae; hair short, yellowish; bristles brown. Pleura bare. Coxae and hind femur with short pale hair; hind tibia and tarsus of nearly equal length; pulvilli as long as claws. Squama white with fringe of long white hair. Scutellum with yellow hair (bristles apparently broken off).

Wing veins dark; stigma well pronounced. Wing hyaline; petiole at base of second posterior cell extremely short; second basal cell slightly longer than

discal cell; petiole on anal cell much longer than posterior crossvein; alula well developed.

Abdomen rather evenly blackish brown; hair golden yellow; venter with lateral margins of segments one to four pale; hair pale yellow.

MALE.—Unknown.

Holotype female from 10 MI. S. SHOSHONI, FREMONT COUNTY, WYOMING, 3 July 1965 (F. R. Holland) as prey of the robberfly *Heteropogon wilcoxi* James. Deposited in the U. S. National Museum.

This fly represents the most nothern record for the genus *Prorates* which was hitherto known only from New Mexico and southern California. It seems probable that specimens should be found throughout the Great Basin.

Porrates melanderi Hall, new species

This species consists primarily of the series of specimens which Melander collected in Borrego, California and which he considered to be the same as *P. claripennis* from New Mexico. I have three additional specimens from Borrego.

The resemblance to *P. claripennis* is remarkably close. *Prorates melanderi* may be distinguished from *P. claripennis* by the golden yellow hair on the abdomen, the lighter colored legs and the slightly longer proboscis.

MALE.—Brownish black; basal antennal segments light brown; legs testaceous; knob of halter dark. Eyes in contact in middle of front for a distance shorter than ocellar tubercle. Inner margin of eyes incised opposite bases of antennae. Small triangular front bare, cinereous pollinose. First two antennal segments equal in length, first segment with a few short, fine, pale yellow hairs at apex; third segment twice as long as two basal segments combined, in lateral view elongate conical, microscopically pubescent; arista minute, terminal. Face bare, few scattered pale hairs below oral opening. Proboscis projecting shorter than height of eye beyond oral margin but reaching beyond tip of antennae. Palpi yellowish, at least half as long as proboscis, with short pale yellow hair. Occiput cinereous pollinose with short pale hair, that on ocellar tubercle yellowish.

Mesonotum cinereous with two darker median vittae; hair short, yellow; lateral bristles yellow. Pleura cinereous especially below, bare except for few pale hairs on mesopleura. Coxae and legs with short pale yellow to white hair, that on femora very short and setiform; hind coxa darker than fore and mid-coxae; hind tibia longer than hind tarsus. Pulvilli as long as claws. Squama white with fringe of long pale hair. Scuttellum blackish brown, somewhat cinereous pollinose; two marginal bristles testaceous; hair white.

Wing hyaline, veins pale brownish; petiole of second posterior cell longer than r-m crossvein; discal cell small, nearly one-half length of first basal cell; petiole on anal cell longer than posterior crossvein; alula developed, rounded.

Abdomen dark brown with golden-yellow hair, may be lighter towards base

of abdomen; posterior margins of second and third segments narrowly white; lateral margin of first three segments white; posterior margins of second and third sternites narrowly whitish. Genital capsule brown with yellow hair, triangular in lateral view with apex bluntly rounded.

FEMALE.—Grayish-black; basal antennal segments darker than in male; knob of halter pale yellowish. Eyes separated at narrowest point by at least width of ocellar tubercle; lateral margin of abdominal segments one to five white. Otherwise as described for the male.

Holotype male and allotype from PALM CANYON, BORREGO, IMPERIAL COUNTY, CALIFORNIA, 3 May 1945 (A. L. Melander). In U. S. National Museum.

Nine paratopotypes and three paratypes, Borrego, Imperial County, California, 3 May 1956 (P. H. Timberlake) in the authors collection.

Prorates nigrescens Hall, new species

This species is readily differentiated from the others by the black hair on the mesonotum and the black scutellar bristles as well as by the darker knob of the halter.

MALE.—Blackish brown; palpi and legs brownish yellow; posterior margins of first four abdominal segments narrowly white. Eyes contiguous down most of front. Ocellar tubercle and small triangular front bare. First two antennal segments short, small, of nearly equal length, both microscopically white pollinose; third segment in lateral view conical, a little more than twice as long as wide, microscopically pubescent; arista apical, minute. Face receding, cinereous pollinose below. Proboscis projecting, reaching beyond tip of antennae. Palpi nearly one-third length of proboscis. Underside of head and lower half of occiput with whitish hair.

Mesonotum when viewed from in front shows three grayish brown median vittae which do not reach scutellum; mesonotal hair short, scattered, erect, black, longer towards scutellum; one prealar and one postalar bristle, both pale in color. Pleura whitish pollinose, bare with few short, fine, pale hairs on mesopleuron. Legs apilose and asetose, covered with minute hair-like setulae; posterior tarsus a little longer than posterior tibia; pulvilli nearly as long as claws. Stem of halter pale, knob black or dusky. Squama dusky with fringe of long pale hair. Scutellum with short black hair with two median, strong, black, marginal bristles.

Wing hyaline, stigma dark brown, anterior veins brown, rest pale; petiole on second posterior cell longer than r-m crossvein; vein M_3+Cu_1 reaches hind margin of wing; petiole of anal cell longer than posterior crossvein; discal cell a little shorter than second basal cell; anal lobe large; alula moderately developed.

Abdomen sparsely white haired. Genital capsule with yellowish hair, in lateral view elongate, narrowed apically.

FEMALE.—Eyes at vertex separated by one and one-half times width of ocellar tubercle. Head cinereous pollinose. Front bare with a narrow longitudinal median depression. Lower half of pleura and all of legs yellowish; spines on ovipositor pale yellow. Otherwise as described for the male.

Holotype male and allotype from RIVERSIDE, BOX SPRINGS MTS., RIVERSIDE COUNTY, CALIFORNIA, 4 July 1969 (J. C. Hall, M. E. Irwin) malaise trap. Both in U. S. National Museum.

One paratopotype and one paratype, topotypic except collected 3 October 1967, in the author's collection.

Prorates frommeri Hall, new species

This species differs from the congeners by the pale yellow basal antennal segments, pale hair on the mesonotum and by the pale legs.

MALE.—Brownish, legs, basal antennal segments, thorax somewhat, venter of abdomen and genitalia pale yellow. Eyes contiguous down most of front; ocellar tubercle and small triangular front bare. Basal antennal segments small, at most with few short hairs; third segment long conical, nearly four times longer than wide, microscopically pubescent; arista terminal, minute. Proboscis projecting beyond oral margin for distance nearly equal to height of eye. Palpi short, pale with pale hair. Face bare. Underside of head and lower half of occiput with white hair.

Mesonotum, when viewed from in front, with three lighter colored median, longitudinal vittae which become coalesced in front of scutellum, lateral margin brownish yellow; hair short, fine, erect, yellow; bristles yellow. Pleura bare small patch of fine hair on mesopleuron. Long hair on legs wanting, femora and tibiae with small setaceous hair; bristles wanting. Pulvilli as long as claws. Halter stem and knob yellowish white. Squama white with fringe of white hair. Scutellum brownish, hair short, scattered, yellow, two convergent marginal bristles testaceous.

Wing hyaline, stigmal area at most only faintly colored; anterior veins brown, rest pale; second posterior cell long petiolate, petiole as long as posterior crossvein; second basal cell much longer than discal cell; petiole on anal cell much longer than length of posterior crossvein; no veins reach posterior margin of wing; alula moderately well developed.

Abdominal dorsum with short, scattered yellow hair; posterior margins of nearly all segments narrowly pale in ground color. Venter with yellow hair. Genital capsule brownish, in lateral view elongate triangular, lower apical corner slightly elongated.

FEMALE.—Head cinereous pollinose; eyes widely separated. Body and legs entirely pale yellowish or straw colored. Otherwise as described for male.

Holotype male and allotype, from P. L. BOYD DESERT RESEARCH CENTER, (DEEP CANYON) 3 MI. S. PALM DESERT, RIVERSIDE COUNTY, CALIFORNIA, 1 October 1969 (S. Frommer), malaise trap at marker #57. In U. S. National Museum.

Two hundred twenty-one paratopotypes collected from 1 June 1969 to 4 October 1969, in a malaise trap.

There is a rather wide range of color expressed from nearly entirely brown (except the legs) to entirely straw colored. The majority of the

specimens are of this latter color, although the males generally tend to be darker. I can find no structural differences between the color variants of this species.

CAENOTUS Cole

(Figs. 4, 8)

Caenotus Cole, 1923: 14; Melander, 1950: 148.

Caenotus was originally described as a therevid. Cole based his decision on the placement of the genus in the Therevidae primarily because of the five posterior cells found in the wing of the genotype species, *C. inornatus* Cole. An examination of part of the type series of *C. inoratus* shows that although there are five posterior cells in each wing the longitudinal veins forming the extra cell arise from the discal cell. In the Therevidae the posterior vein forming the fifth posterior cell arises from the small crossvein at the base of the discal cell. The other three species of *Caenotus*: *C. canus* Melander, *C. minutus* Cole and *C. hospes* Melander, all have only four posterior cells.

Melander (1927) transferred *Caenotus* to the Bombyliidae. In 1950 he recharacterized the genus and gave a key to the species together with the descriptions of two new species. I can add nothing more to Melander's remarks.

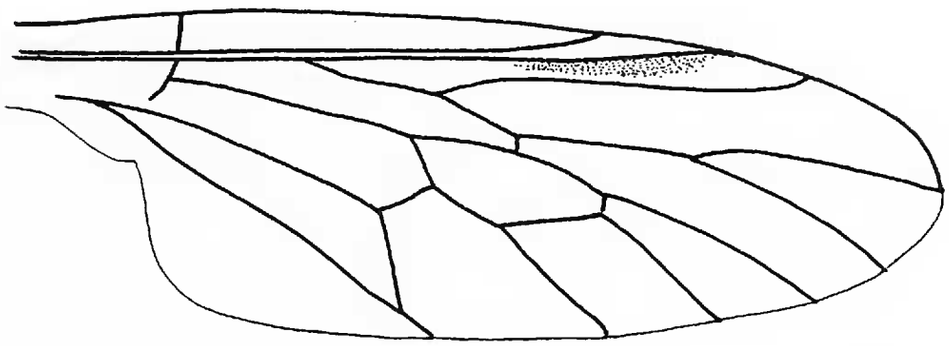
Caenotoides Hall, new genus

(Figs. 5, 6, 7)

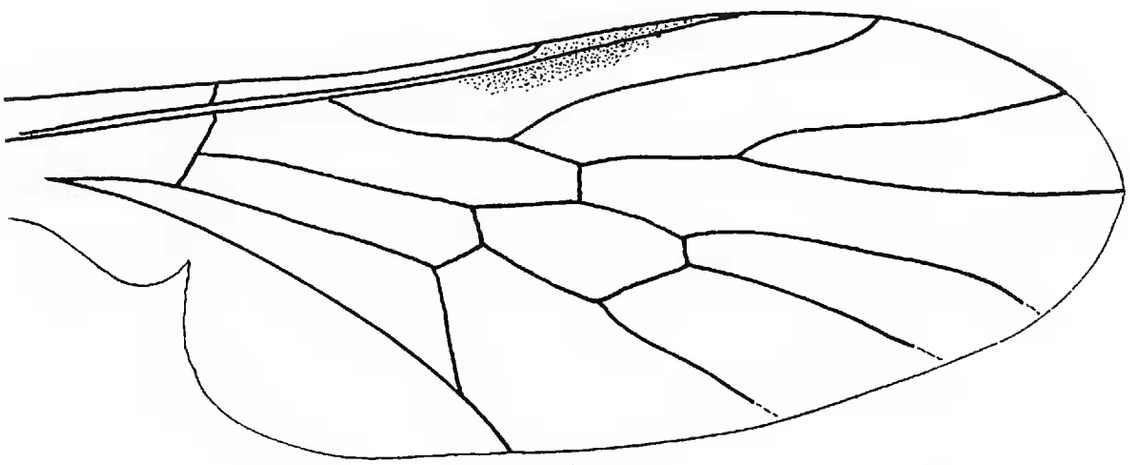
The new species described below were discovered during the course of study for this report. The one striking difference noted about the specimens was that the third antennal segment terminated in a microscopic tuft of hair. The only other genus of bombyliid sharing this characteristic is *Anthrax*, a group to which these specimens obviously do not belong.

Caenotoides is similar in habitus to *Caenotus* but differs by the shorter and less abundant pile on the body, the shorter one-segmented palpi, the tuft of hair at the tip of the third antennal segment which is not separated by a distinct suture and by the costa terminating at the third longitudinal vein or only slightly beyond.

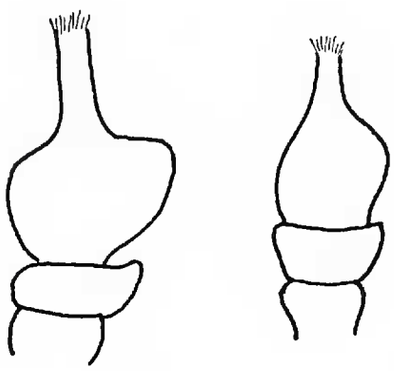
Small flies, up to 4 mm in length. Eyes of male contiguous, widely separated on female; lower half of eye of male more finely faceted than upper half, facets of female uniform in size. Ocellar tubercle large, ocelli form equilateral triangle. Antennae approximate at base, first two segments nearly equally short, both broadened apically; basal half of third segment short, broad, apical half styliform, about as long as basal portion, terminating in tuft of minute hair.



4



5



6

7

8

FIGS. 4 & 5, wing of holotypes. FIG. 4. *Caenotus hospes*. FIG. 5. *Caenotoides californica*. FIGS. 6–8, lateral view of antenna. FIG. 6. *Caenotoides californica*. FIG. 7. *Caenotoides idahoensis*. FIG. 8. *Caenotus hospes*.

Oral opening reaches base of antennae. Proboscis short, about half as long as oral opening; palpi very small, one-segmented. Face rounded, not protruding, receding below. Occiput flat. Head slightly wider than width of thorax. Mesonotum rounded, without apparent bristles, hair short and sparse. Legs with short setula-like hair; pulvilli present, much shorter than claws. Scutellum rounded without marginal bristles. Wing hyaline, at most stigmal area slightly colored; two submarginal cells; four posterior cells, all open in wing margin; costa terminates at tip of third vein or only slightly beyond; apical portion of vein R_5 from branch of R_4 to tip of wing longer than basal portion from branch of R_4 to r-m crossvein; medial crossvein at base of third posterior cell arises from discal cell; discal cell much smaller than either basal cell; anal cell closed before wing margin and petiolate; anal lobe large; alula small. Abdomen of male with seven visible segments, female with eight. Genital capsule large, rounded, medially divided.

Genotype.—*Caenotoides californica* Hall, described below.

Key to Caenotoides Species

1. Third antennal segment gradually attenuated to styliform apical one-half, legs not black 2
   Base of third antennal segment broad then suddenly constricted to apical styliform portion; legs black, tibiae testaceous ..... *californica* Hall, n. sp.
2. Legs flavo-testaceous; abdomen pale yellowish with basal black stripe on second segment ..... *mexicana* Hall, n. sp.
   Legs dark brown; abdomen white or whitish, base of second segment black ..... *idahoensis* Hall, n. sp.

Caenotoides californica Hall, new species

(Figs. 5, 6)

Male.—Black, subshining, abdomen other than base of second segment, venter and genitalia, white. Legs black, tibiae testaceous; halter stem brown, knob white. Vertex vaguely whitish pollinose. Hair on ocellar tubercle short, erect, white. Small triangular front bare, whitish pollinose. Basal antennal segments equal in length, second segment much broader apically than the first, both with few minute pale hairs; base of third segment, in lateral view, not as broad as second segment but broadly flattened, suddenly and sharply constricted to apical styliform half which terminates in a tuft of microscopic hair or setae (Fig. 6). Face whitish pollinose laterally near antennae, white hair at sides below. Oral opening wide, reaching base of antennae or nearly so. Proboscis short, black. Palpi extremely small, black. Lower half of occiput with long pale hair, upper half nearly bare except for a few short hairs next to eye margin.

Mesonotum, when viewed from in front, with three vague brownish median vittae which do not reach scutellum; pile pale, short, scattered. Pleura bare with few short fine hairs on meso- and stenopleurae. Hair on legs setiform, not long or dense; apical tibial bristles small, fine. Squama white with fringe of white hair. Scutellum brownish pollinose, hair white, scattered, fine, those hairs along posterior margin a little stronger but not bristle-like.

Wing hyaline, veins brown; costa terminates slightly beyond apex of third

longitudinal vein, ambient vein not evident; third posterior cell of nearly equal width throughout; petiole on anal cell equal to length of posterior crossvein.

Abdomen elongate, cylindrical with short, fine, scattered pale hair. Venter with much shorter pale hair. Genital capsule rounded, shiny, lateral pieces with short white hair, apex rounded.

FEMALE.—Front whitish yellow pollinose, small, narrow, median black stripe just below median ocellus. Mesonotum brownish yellow pollinose without apparent vittae; humeral and postalar calli a little lighter in color than notum; hair on mesonotum pale yellow. Pleura black, upper part of sternopleuron and small spot on posterior portion of mesopleuron yellowish. Abdominal dorsum with small blackish spots on sides of second to fifth segments, sixth and following segments entirely black as is middle of venter. Each side of ovipositor with five stout, blunt spines. Female otherwise as described for male.

Holotype male and allotype from 3 MI. N. OF NORTH PALM SPRINGS, RIVERSIDE COUNTY, CALIFORNIA, 25 February 1968 (M. E. Irwin). Both in U. S. National Museum.

These specimens were take in copulo and are mounted on one pin, the male being uppermost.

These flies were collected in a sand dune association. They were flying close to the ground among the sparse grass and when captured they were very reluctant to rise into the net. Only one other male was collected at the same time. There were probably more specimens but because of their small size and camouflaged appearance they were overlooked. Repeated attempts to collect more specimens have brought negative results.

Caenotoides idahoensis Hall, new species

(Fig. 7)

Very similar to *C. californica.* Differs primarily in the shape of the third antennal segment and the blunt apices of the lateral pieces enclosing the genitalia.

MALE.—Basal portion of third antennal segment gradually constricted to apical styliform one-third. Mesonotum entirely black. Wing veins yellow. Black mark at base of second abdominal segment not dark, rather obscure. Extreme lateral margins of abdominal segments four to seven yellowish. Legs dark brown. Otherwise identical to description of *C. californica.*

Holotype male from BRUNEAU, OWYHEE COUNTY, IDAHO, 23 June 1938 (H. M. Harris). In U. S. National Museum.

Caenotoides mexicana Hall, new species

Quite similar to the congeners. Differs mainly by the flavotestaceous legs and the absence of the black stripe across the base of the second abdominal segment.

MALE.—Palpi pale yellow. Abdomen yellowish not white; mesonotum vaguely brownish yellow pollinose without vittae. Antennae like that in *C. idahoensis* except styliform portion equal in length to broadened basal portion. Body with white hair except that on scutellum yellow. Dark stripe across base of second abdominal segment wanting. Venter dark in middle of fourth segment only. Specimen otherwise as described for *C. californica.*

Holotype male from 23 MI. E. SAN LUIS, BAJA CALIFORNIA, MEXICO, 24 April 1962 (M. E. Irwin). In U. S. National Museum. Type was collected in a sand dune association.

LITERATURE CITED

BEZZI, M. 1926. Notes additionelles sur les Bombyliides d'Egypte. Boll. Soc. Roy. Entomol. Egypt, 18: 244–273 (1925).

COLE, F. R. 1923. A revision of the North American two-winged flies of the family Therevidae. Proc. U. S. Nat. Mus., 62(4) : 1–140.

EFFLATOUN, H. C., BEY. 1945. A monograph of Egyptian Diptera. Part VI. Family Bombyliidae. Sec. 1: Subfamily Bombyliidae Homeopthalmae. Bull. Soc. Fouad d'Entomol., 29: 1–483.

LOEW, H. 1873. Beschreibung europäischer Dipteren. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insecten, von Johann Wilhelm Meigen. Vol. 3, 320 pp. Halle.

MELANDER, A. L. 1906. Some new or little known genera of Empididae. Entomol. News, 17: 370–379.

1927. Diptera. Fam. Empididae. Fasc. 185, 434 pp. In Wytsman, P., ed., Genera insectorum. Bruxelles.

1950. Taxonomic notes on some smaller Bombyliidae. Pan-Pac. Entomol., 26: 134–144, 145–156.